7N-72-CR
136348
24P

NASA: W-3134-64
JPRS: R-1547-D

20 April 1961

THE ATOM MODEL OF THE PHOTRON THEORY

(NASA-CR-182730) THE ATOM MODEL OF THE PHOTRON THEORY (Joint Publications Research Service) 24 p

N88-70810

Unclas
00/72 0136348

U. S. JOINT PUBLICATIONS RESEARCH SERVICE
1636 CONNECTICUT AVENUE, N. W.
WASHINGTON 25, D. C.

THE ATOM MODEL OF THE PHOTRON THEORY

/Following is a translation of an article by K. Nowak in the German-language periodical Neue Physik (New Physics), published in Vienna, Vol. 2, No. 1/2, 1960, pp. 1 - 41./

(Continuation of article in No. 4/5, 1959.)

Content: In the first part of this work (1) it was shown that the photron concept of light and matter verifies qualitatively and quantitatively the circumstances of atomic light-emission. The following Part B deals with the nature of the nuclear matter. To consider nuclear particles as photron configurations explains, on the one hand, that a nucleus can also emit particles which - at a first glance - are not even contained in it; on the other hand, it makes possible an understanding of nuclear forces. Furthermore, an explanation of the cause of constant movements within nuclear matter and the occurence of "transformation processes" results; treated as well are questions regarding the stability of the nucleus and the structure of the nucleon as derived from scatter-experimentation. Part C summarises the results of the entire work and also gives additional pointers, especially regarding erroneous calculation values of radiation energy.

B. Construction of the Atom-Nucleus and Nuclear Forces

Thus far, conditions in the electron layer of atoms as a result of the connection between light emission and absorption by the atom have been observed in this work. At first, the nucleus of the atom as such is not examined very closely, or, it is treated as an unchangeable body with a given positive charge, larger in its solid substance than the electron.

But, as is known, the nucleus of the atom is by no means a simple structure. Even the proton, as the nucleus of the hydrogen atom and as an assimilated particle of composite nuclei, must have a structure, as results of scatter-experiments have shown. Here, too, a structure of positive and negative photrons similar to that of the electron explains why this spatial structure does not explode because of its electrical-charge distribution and the resultant electrical charges.

A great amount of literature dealing with the conditions in the nuclei of higher atoms, which at the present — and according to Heisenberg — are thought to be composed only of protons and neutrons. These nuclei shall be called "compound-nuclei" in the following. Actually, the mass of the compound-nuclei always approaches the multiple of an "atomic-mass unit" of the size $1{,}660 \cdot 10^{-24}$ g. Therefore, the nuclei may be characterized by two whole numbers, namely the with Z designated "nucleus-charge number" as the number of the occurring positive elementary charges (number of protons in the nucleus), and the "mass number" A as the number of atomic mass units in the nucleus, rounded out to a full number. The assumed number of neutrons of the nucleus is the resulting difference between A and Z, the nucleus-charge number Z corresponds to the atomic number in the periodic system of the elements. The nucleus shall therefore consist of no other components than protons and neutrons. Especially electrons shall not be present in the structure of the nucleus, since it is presumed at the present that their elementary charge would change the nucleus-charge number. The fact that such nuclei may emit in addition to radiation quanta also electrons, positrons, neutrinos, and mesons, which seemingly were not even present in them before, shown already that at least change-processes must be occurring. An explanation of the conversion of particles into another could also possibly be concluded from a uniform field conception, but it is less complicated and easier to understand by means of the photron concept. Here we do not theorize with an abstract, general world field (or even with several such fields) out of which energy is supposed to materialize or in whose background particles can disappear again through dematerialization; here we deal with classical matter. The emitted particles are apparently already before their emission from the nucleus virtually in existence(2); and this corresponds fully with concepts advanced of late(3). By "virtual", according to the photron concept, is meant a quite matter-like condition, namely a photron configuration within the remaining mass of photrons which corresponds fully with the structure of the particular particle; or, in other words, a factual existence of a definite particle which only has not separated itself yet.

The present problem of nuclear physics is the question of nuclear forces and the structure of the nucleons. According to experimental findings, a strong power of attraction exists between the positive protons themselves and between them and the neutrons; these nuclear forces, of which the cause is still unknown and which occur contrary to the coulomb-repulsion, are, however, effective only over a distance of less than $2 \cdot 10^{-13}$ cm. Thus, the nucleons intensively attract another only within such short distances. Over greater distances, the effect of the protons upon each other apparently is still one of repulsion because of their identical coulomb charge. On the other hand, a strong repulsion is said to exist between nucleons, as between rigid spheres, even at closer proximity, in the area of approximately $0.4 \cdot 10^{-13}$.

A satisfactory explanation is presently lacking for these conditions. In old publications, the phenomenon of nuclear forces is explained as resembling rigid spheres /such as marbles/ in a pot. In order to release the nucleons from a nucleus, they must be lifted over a potential rim like the spheres in the pot. According to this, the law of coulomb would not apply in the area of nuclear distances. The great total charge of the compound-nuclei indeed constitutes a potential wall difficult to overcome by the foreign protons, while, on the other hand, the indigenous protons of the nucleus stay arrested by great forces; they are, so to speak, inside of the potential wall. The nuclear forces are to be "exchange forces" between nucleons insofar as an exchange of charges takes place between protons and neutrons. This would also explain why, during disintegration processes, beta particles may be emitted. However, it is difficult to understand, that an exchange effect between positive and uncharged nucleons should release such great nuclear forces; also, such effects cannot be observed outside of the nuclei. With help of Dirac's wave mechanics, Enrico Fermi tried to determine the nuclear forces resulting from an assumed exchange of beta particles, but the values received were too small. Therefore, according to Yukawa, pions (π-mesons) are said to be responsible for the binding forces of the nucleus. The mass of these particles, which are said to be the link between protons and neutrons without being innately permanent part of the nucleus, was computed by Yukawa from the range of nuclear forces, and such particles were later discovered by Powell in cosmic radiation. An artificial production of these short-lived particles subsequently succeeded in Berkeley with help of the synchrocyclotron located there. The pions are said to travel virtually back and forth in an exchange between the nucleons, "virtually" here meaning a field condition expressed in form of a wave equation. The change effect consists hereby in their mutual production and destruction.

Thus, and according to the description of field physics, the forward motion of an automobile would not simply be a locomotion: It would destroy itself continuously in back and reproduce itself in front; i.e., it would disappear in the field background and re-appear from it again. This illustration may well seem nonsensical when one considers it as real. But in fact it is only a mathematical fiction which hardly can be credited with reality; rather, it is a means to make possible the quantitative summation of conditions heretofore seemingly unexplainable by real means. After all, the "modern" computation methods of field physics have in their final instance their origin in the erstwhile purely mechanical ether conception of Faraday and Maxwell, i.e., in an outdated conception of the last century. In the atomic nucleus, too, physical reality will have to be found in real conditions of matter and not in the conditions of an abstract quantum field. Just as for conditions in the electron layer (Part A of this work), a realistic explanation will form the basis for a mathematically correct estimation of the nuclear conditions.

According to the photron concept, every atom nucleus as well as all other matter consists primarily of positive and negative photrons which are in regard to their charge partly balanced so that only the charge difference resulting from number and arrangement of the photrons will gravitate as a nuclear charge to the outside. Electrons circling around the nucleus thus may possibly exert an influence on the nuclear structure; for example, they may set off surface waves on the nuclear structure by dragging along part of the nuclear matter, thereby having an effect like that of the moon on the oceans of the earth. Foreign particles may act in a like manner and may, with high energy, cause a nuclear stimulation (Coulomb-stimulation).

The nuclear situation is naturally not that simple. Among other things, every nucleus is affected by many various radiations and is exposed to other energy influences. These conditions exist concurrently with motions in the interior which, just as the circulation of the electrons, are not necessarily timely limited. Above all, parts of the nuclear mass can react in various ways, depending on local circumstances. Thus, "virtual" corpuscles may form which eventually may take the form of real corpuscles and as such may leave the nucleus under certain conditions. Stable are in this case apparently such structures, which preferably have an electrical "elementary charge" or at least are composed that way(4).

As already mentioned, by "virtual configuration" is meant in each case the formation of a regular "elementary particle" in the photron mass of the nucleus, so long as this particle (already existing as a configuration according to the "layer construction") has not separated itself, something that may have occurred already — even within the nucleus — as a result of motion, especially (but not only) a rotating motion. Therefore, the "birth" of a particle would consist of two phases: of a (to begin with) "virtual" formation, and of its separation as a corpuscle through rotation or through other special movement of this photron complex within or without of the remaining nuclear mass.

The question of the binding forces will appear again when one assumes, that such protons and neutrons — in the form of more or less stable photron complexes which are separated already and are rotating or in some other state of motion — indeed constitute the main components of the compound-nuclei. This question shall be dealt with henceforth in this work.

According to the Coulomb law, two protons will repel each other, because of their positive elementary charge, with a force $\frac{e \cdot e}{a^2}$ when one proceeds with point charges of value e, their distance being a. Because of the actual existence of strong nuclear forces (i.e. an attraction instead of a repulsion), the validity of the Coulomb law in the atomic area has already been questioned; a sofar unknown "nuclear force" is said to increase exponentially and is said to become "much stronger than the electrical forces" for distances of the order of magnitude 10^{-13} cm. Furthermore, protons are certainly not point-shaped, since they possess considerable mass in addition to their charge.

According to a valid concept and as already mentioned, pions are the connecting links between protons and neutrons in the nucleus; but this does not make clear why, of all things, these corpuscles — as "nuclear field quanta" — are to effect the change effect of the nucleons.

And furthermore it is still not clear, how, on one hand, the positive repulsion among the protons should be overcome, and, on the other hand, why nucleons repel another when in close proximity, contrary to acting nuclear forces.

In the following an attempt will be made to create a better understanding of the nuclear forces, although it must be emphasized at the outset, that it will be only a rough and schematic outline and that it may differ considerably from actual conditions. And allowance should also be made of the fact that according to the theories advanced thus far in this work one does not necessarily deal with the effects of definite, unchangeable corpuscles in the nucleus; yet, on such theory will be based the following presentation. Be this as it may, it will be shown in the following that with help of the Coulomb law the attraction and repulsion areas of nuclear forces can be realistically explained when one proceeds under the assumption of a spatial structure and charge distribution of the nucleons as suggested by the photron theory. Also considered will be to what extent negative pions may constitute the links of protons in the nuclei.

Figure 1 shows two assumed proton corpuscles of assumed spherical shape, designated 1a and 1b. As already mentioned, such configurations may form in the nucleus through rotation of certain photron complexes, which in turn may have inner structures or configurations making them electrons, positrons, positive and negative mesons, and the like, and which — together with the remaining photrons as "filler mass" — make up compact packings of the "proton" type. These structures of charged-masses, already recognizable as definite corpuscles and presenting themselves as protons, have electrical charges on their surfaces and therefore repel another as Coulomb electrical charges of the same polarity. Let it be supposed now that the charges — regarding their exterior Coulomb effect — are given off the surfaces only (as can be deduced from the photron theory), and that they are about evenly distributed over the surfaces. Also justifiable is the supposition that in the nucleus of larger "corpuscles" only a fraction of the surface charges will become effective aversely. This is so because a "photron filler mass" may act as a shield between the "corpuscles", not unlike the effect of the plasma of a gas discharge, which can shield the field effects of electrodes to within a short distance.

Under this assumption and as shown in Figure 1, the charging surfaces of "protons" 1a and 1b, facing each other and having charges of identical polarity of identical value L_1, become effective upon another. Therefore, a mean distance must be provided, which is either distance A between the centers of the proton corpuscles or, when one considers only the juxtaposed surfaces of the hemispheres as effective charging surfaces, the distance a as shown in the drawing, which is arrived at by halving the surfaces of the hemispheres:

$$\frac{\pi \cdot D^2}{2} = 2\,D \cdot \pi \cdot h; \quad h = \frac{D}{4}.$$

This results in the repellent force according to the Coulomb law as $\frac{L_1 \cdot L_1}{a^2}$.

Now, when there is a negative charge mass between these positive photron corpuscles, for example an electron designated with 2, then an attractive force exists between this electron and the positive proton charged-complexes; the value of this force is — in the shown (and simplest) case of a central location and at a given effective negative charge e of the electron in between — in each case $\frac{L_1 \cdot e}{b^2}$. For the case that spatial expansion of charge e is variable, the distance b equals $\frac{a}{2}$. Under the same conditions, the full charge value (i.e. charge value e of the electron) can be expected in every case. When b equals already $\frac{a}{2}$, then is under the assumption $L_1 = e$ the attractive force of the negative charge for every positive corpuscle four times as great as the repulsion by the second positive charge. Thus results a "nuclear force" as "attracting force between proton corpuscles" which is eight minus one, i.e. seven times as great as the repulsive force between these electrical charges of same polarity that can be expected according to the Coulomb law. In the case $L_1 = \frac{e}{2}$, the attractive force proton - electron is eight times greater than the repulsive force proton - proton, so that the resulting "nuclear force" is fifteen times as great. Similar conditions would prevail in case of the presence of a negative pion 3. The quantitative relations of an electron 2 and a pion 3 are shown in the drawing under the assumption of equal mass density in relation to the size of the proton. The diameters of protons, negative pions, and electrons approximate under the named condition of equal mass density the ratio of the third roots of 1836.1, 273, and 1, or 12.24 to 6.48 to 1 (i.e. as 10 to 5.3 to 0.82). However, for a meson (pion), as is similarly the case for protons, allowance would have to be made for a spatial charge distribution.

Thus, protons 1a and 1b should move strongly into the proximity of a negative charge complex 2 or 3 as soon as the resulting attractive force overcomes the effect of an existing motive energy, which seems to be the case at distances below approximately 2 to 1.4 Fermi. Now the question is whether or by what this attraction is limited.

At first the attractive force increases constantly with a reduction in the distance of the proton corpuscles to the negative electrical charge lying in between. Since this is determined in each case by the square of the halved distances between protons or by smaller distances, and since extent of the effective surface charges may also change, the resulting "nuclear force" grows exponentially. But it can be presumed that this growth caused by the movement of the proton corpuscles toward an electron corpuscle that lies in between may find an end or (the attractive force) may decrease, since, possibly, the charge of the small-dimensioned corpuscle (electron) now only affects a greatly reduced area of the surface charge of the much greater proton corpuscle.

While in Figure 1 the distance A between corpuscle centers 4 and 5 is shown to be twice the length of the proton diameter D, Figure 2 shows proton spheres 1a and 1b, with electron corpuscle 2 located in between, in a proximity of almost touching another ($A_1 = 1.1$ D). In the latter case the electron charge would therefore affect only a part of the charge surface of protons 1a, 1b, while the repulsive effect of the proton surfaces would continue to be almost unimpeded.

It must be assumed, that a limitation of the Coulomb influence of an electron 2 upon a part of the charge surfaces of proton 1a, 1b is related to that part of the sphere's surface which is limited by a cone delineated by a tangent from the center or from circumferential points of the small electron sphere to the proton sphere. One will obtain fairly correct results when one considers as relative the area of the spherical segment at diameter d to the hemispherical area at diameter D. The effective distances are then in analogy with Figure 1 relevant to these diameters or to mean diameters.

As shown in Figure 2, with a distance between centers of the proton corpuscles $A_1 = 1.1$ D, the height of the spherical segment delineated by the tangential cone (and therefore its surface area) equals 9% of the sphere's surface area, i.e. 18% of the hemisphere's surface area. Halved, the height of the spherical segment results in a mean "effective distance" $b'_1 = 0.095$ D as compared with a mean "effective distance" a_1 of the proton corpuscles of 0.6 D.

This results in an attractive force which as $2 \cdot \frac{0.09\, e \cdot e}{0.095^2}$ is approximately 30 times greater than the repulsive force $\frac{0.5\, e \cdot 0.5\, e}{0.6^2}$ of the proton corpuscles against another (ratio values 20 to 0.69). For the distance A = 2 D shown in Figure 1, however, the result is — as already mentioned and under identical conditions — an attraction — repulsion ratio of 16 to 1.

Thus it shows, that the assumption of a limitation of the charge influence of an electron 2 on a part of the charge surfaces of proton corpuscles 1a, 1b via a reduced "effective distance" b'_1 would lead only to still higher "nuclear force" values than can be expected with greater distances or without this assumption. This follows from the fact, that the square of the effective distances is responsible for these values. In any case, this view shows that the effect of a distance reduction outweighs the effect of an eventual reduction of the "effective charge area". The above-used simplified approximation, which uses mean charge distances, becomes less accurate with shrinking distances because of the square progression of the Coulomb law; yet, if one chooses to integrate the Coulomb effect over the charge areas, the received values of the dominating attractive forces will be even greater.

The increasing "nuclear force" would therefore essentially remain effective so long as a negative corpuscle is at all existent between the protons. This points to the assumption of the following mechanism of cohesive conditions in the compound-nuclei and/or the change effect between protons and a connective electron: The electron, situated between the protons, is received by one of the protons (because of the Coulomb attraction) and penetrates into its structure. This will hardly change the exterior charge conditions of the receiving proton. But the mutual repulsion of the protons will be resumed with full force again because of the elimination of the binding force. The "swallowed" and apparently "destroyed" electron, however, will be ejected again in its old or (possibly) in a changed form, seemingly "newly created", because of the occurrence of an inner charge instability. Then the game starts anew, and this mechanism causes on the one hand inner movement in the nucleus because of strong change effect forces while changing kinetic energy into potential energy and vice versa, and on the other hand it formulates mean distances of this interplay. Since the proton configurations may be deformed during these processes, a repulsion range of 0.45 - 0.4 f, the radii within which the protons repel another "like hard marbles", is indeed acceptable.

The "creation" and "destruction" of binding matter between "nucleons" would therefore occur only seemingly and without a change in their mass values, and thus contrary to the current field concept. Matter does not change into energy and vice versa but is preserved unchanged; only their energy forms are subject to change.

Thus, "nuclear forces" seem to be explainable as Coulomb three-structural forces. Because of the exponential progression of nuclear forces, seemingly contrary to the electrostatic repulsion of the protons in the nuclei, the validity of the Coulomb law for distances of the order 10^{-13} cm has been doubted heretofore; or the question has been raised whether the traditional assumption regarding nuclear forces or computation methods used heretofore are correct[5].

These discussed circumstances of occurring nuclear forces point thus to the presence of photron configurations within the compound-nuclei, which preferably are thought to be electrons as to form. Against the presence of pions instead of electrons speaks their high mass value. In the case of a combination, the great mass of pions would probably rob the configurations of the masses of protons of their individuality. The described conditions also suggest the assumption that the charge of a binding electron will be shielded to within short distances, and therefore scarcely will appear on the outside.

As already explained, in accordance with present concepts, the nuclear mass will not at all stay inert; all defined corpuscles in the nuclear mass will be in a particular state of motion. But the nucleus may also contain photron complexes in a state of change in addition to electrons, such as mesons and similar, known "elementary particles", not unlike the ones that emit from unstable nuclei. And as already mentioned, the inner structure of protons or neutrons is again a configuration of small complexes of photron masses, which may resemble electrons, positrons, and mesons in their structure, but which together in a quite compact packing form the nucleon.

As already presented in an earlier work[6], the formation of photron structures seems to progress favorably until the appearance of "elementary charges" e, at which point the most stable condition is reached. The most stable structures are therefore electron configurations which attain, with the smallest mass value, the elementary charge e; they may form in connection with other photron concentrations composite parts of larger "elementary particles". Protons, neutrons, electrons, positrons, and mesons may then — with or without additional photron-"filler mass" — unite to form compound nuclei. But also present will always be loosely connected photrons, even if only caused by heat radiation.

The existence of nuclear forces as described here is without doubt too rough and schematic to represent truly reality, the more so since there will be also magnetical effects of rotating charges and many various effects of multiple bodies. But in spite of the assumptions, this account should help to a better understanding of the problem of nuclear forces.

It should especially be kept in mind that nuclear matter is not to be considered inert. The links of "nucleons" and the remaining nuclear matter in between may undergo a constant exchange. Thus the binding matter between "nucleons" may cause inner movements in the nucleus in the described manner, but these inner movements may also lead to varying connections between nucleons.

Naturally it is not absolutely necessary that the "binding matter" between protons is in the form of electrons. Also, this matter might be received and expelled again proportionally by all participating protons.

And the conditions of stability of the nuclei can also be explained in terms of the photron theory.

While electrons in the electron mantle of atoms, according to the new concept, because of the attractive effect of the nuclear force may have a greater photron mass value than while free[7], the situation for the protons of the nucleus may be the reverse, since they repel another at least some of the time and with part of their surfaces. Thus, during the fusion of light nuclei into a medium nucleus, a part of the nuclear matter will be excessive and will be tossed off with an energy[8] corresponding with the originating surplus potential, which explains the freeing of energy during nuclear fusion. Part of the photron mass given off by protons may form new configurations as binding or shielding mass and will therefore remain in the new nucleus. On the other hand, the accumulation of many protons will increase the chance of nuclear disintegration, since a repulsive force with corresponding surplus charges will grow by the square (see footnote 8). Therefore, there must be relatively more binding matter present in heavy nuclei in order to counter this tendency to disintegrate as much as possible. So far it has been assumed that neutrons outnumber protons in heavy nuclei. However, according to the new concept it is thought to be possible that part of these apparently present neutrons is not contained in these configurations but in the nuclei as a binding and neutralizing photron mass ("filler mass"), whereby disintegration is prevented or — through shifting processes — arrested or delayed. This, then, is why "super-heavy" nuclei cease to be stable. Most stable appear to be the medium nuclei or certain structural systems following the "magical numbers". Here the nucleons and other nuclear-matter configurations seem to be arranged in such balance, that on one hand the relatively least mass value of the nucleus is required and/or occurs, while on the other hand the occurring repulsive forces seem to be largely neutralized by the binding matter. Thus such nuclei will show great stability; they will not disintegrate by themselves nor will medium nuclei give off surplus energy when artificially split.

But the stability of nuclei may decrease through "surplus mass", as we know from certain isotopes or from the splitting of heavy nuclei through slow, thermic neutrons. At first, neutrons will easily penetrate as "neutral" corpuscles into a nucleus. But if they change into a proton while arranging themselves into the nuclear-matter configurations, then this could lead to a splitting of the nucleus because of the resulting high inner potential (9).

Furthermore it seems to be clear that the connecting links between protons, suppose electrons, are held by the nucleons in such a manner that, as a rule, they can be emitted from the nucleus only during disintegration processes.

In the outer electron mantle of the nucleus the atom electrons have not only a higher mass value, but also a greater charge value, since their elementary charge while free is determined only by a stability condition; but in a nuclear combination the Coulomb retaining force of the nucleus will have to be added (7). The same will have to be considered for nuclear protons in charge-connection, that is, for protons held by electrons in between ("nuclear-force cohesion"). Their photron configuration may thus contain more resultant positive charge at less mass value than when free and may thus completely neutralize a charge effect of the inbetween electrons directed to the outside.

At the present, a charge exchange between nucleons has already been accepted. According to the photron theory, such a process is held to be possible, although thought improbable without additional stimulus, especially without influence from the outside. More obvious are lesser charge and mass changes of configurations which can be considered as nucleons, on grounds of actually effective nuclear forces which, as already shown, can be explained in terms of known laws.

But a proton "charge surplus" within the nuclear matter will by no means reach the value of a double elementary charge; corresponding with the assumed adhesion of two protons to an electron in between them, it will amount to a maximum of half of an elementary charge or less. However, because of the inner charge connection a maximum of only one elementary charge e per proton in the nucleus will become effective toward the outside; it should also not be forgotten that, "electrically", a charge subdivision will always have to be accomplished and assumed in full elementary charges (10).

According to hitherto-prevailing concepts, the mass becoming excess during the splitting of heavy nuclei or during the fusion of light nuclei, i.e., the "defecting mass", is said to "change into energy". The Finstein equation $E = m \cdot c^2$ yields for one "atomic mass unit" (ME) an energy equivalent of 931 MeV. But according to the author's theory the value of the excess photron mass stays unchanged and the freed energy emanates from a created energy potential, namely the Coulomb potential of its charges of identical polarity. In every case the energy is thereby bound to mass: at first as potential energy of excess charges, and then as kinetic energy of the emitted particles or radiation(11).

The forces between protons and neutrons will be of similar nature as those between protons only; but in this case it seems that the connecting links are more or less dispensible. If one assumes (in agreement with already advanced theory) that the neutron possesses a negative surface charge which lies below the value of an "elementary charge"(12), then a photronic (photron-electric) attraction exists between proton and neutron. In any case one can proceed from the assumption that the neutron is carrier of photron charges which only do not reach the value of an "elementary charge e". But only an attraction between protons and neutrons as such would doubtlessly fail to explain the nuclear forces.

Of course, in given cases magnetic forces may exist or even prevail between neutrons. And on the whole, always expected must be a combination of electric and magnetic binding forces between all defined (defined through self-rotation, etc.) configurations of nuclear matter.

Since "elementary particles" and nuclei, too, are composed of layers it can be assumed, that the "inner layers" show greater stability than the outer layers, especially since an equally great photron complex (charging part) will represent a greater percentage on the smaller layer. This results in the various "energy levels", which can be determined through excited or unstable nuclei during the emission. The more stable one of these "layers" is constructed the greater must be an energy influence that is to cause its disintegration or its "stimulation"; but naturally, the greater, too, will be the energy of ejected particles and emitted radiation.

But while photron layers of "elementary particles" may be inert, the protons contained in the "nuclear layer" will be in constant motion (according to the above-explained mechanism), so that the "layers" are at least in something of a state of vibration. Such vibration may be increased through external energy influences and the whole nucleus may be excited through it (collective stimulation).

When a part of that nuclear mass which at the present is attributed to neutrons does not have this configuration but instead occurs in the nuclei as "binding", "shielding", or "filler" mass, then the question is justified how the familiar mass number of "atomic mass units" can appear. But this, too, can be explained when one assumes that a certain number of protons will always require a certain quantity of additional (other) nuclear matter in order to function in the described manner. Of course, this relation will not be linear, but will correspond with the known conditions in the nuclei.

Since the forces in the atomic nucleus will always constitute a multitude-of-particles problem, it seems that present mathematical methods are insufficient for a correct portrayal, even with a knowledge of the theoretical principles of nuclear forces. This is the reason for a return to illustration with models during the examination of nuclear conditions, while "modern" physics has abandoned such models in the treatment of other problems. The photron-nucleus model of the author doubtlessly represents an advance, since with the help of it the nuclear forces can be explained in principle. A simple method for the comprehension of Coulomb multiple-body influences has also been worked out by the author[13].

There was a time when the proton was considered a rigid elementary corpuscle with a positive charge and the neutron as a particle almost analogous, although slightly larger, but without a charge. But in the meantime the Stanford scatter experiments have shown, that protons, too, must have a structure. Thus, the charge of a proton is neither evenly distributed over its volume nor is it concentrated in its center.

From the scatter experiments at Stanford has been deduced a model of the proton structure. According to it, the proton consists of a negative "hard core" enveloped by a "cloud" of positive mesons[14]. This structure is to explain the potential distribution noted during the scatter experiments. This results in a mean nucleon interval about four times greater than the minimum distance, thus being in the order of magnitude 1.4 f[15].

The "range of nuclear forces" of 1.4 f assumed at the present is computed according to the field concept under application of the mass value of the pions (the pions, which are "virtually running back and forth between the nucleons" and which supply — through their "destruction and recreation" — the nuclear forces) and under consideration of the uncertainty relation $\frac{\hbar}{m \cdot c} = 1.4\ f$. The mesons "exist only within the quantum-mechanical fluctuations of the system". It appears therefore highly questionable whether this value of the range of nuclear forces is indeed valid. But the area of nuclear forces is certainly to be found within the indicated order of magnitude.

But the "cloud model" of the nucleons is afflicted with numerous contradictions. The mass of a pion is greater than 1/10 of the total proton mass; a "pion cloud" can therefore consist of only a few pions. And when a pion is ejected from the proton by the push of an energy-rich particle, the proton supposedly remains unchanged; i.e., the "pion cloud is self-regenerating" — a process difficult to understand. Also doubtful would be the charge distribution. It is assumed that the "core" has a negative charge "0.2" and the meson cloud a positive charge "1.2" so that the positive charge "1" would result[16]. But how can a central negative charge "0.2" keep together a "meson cloud" of a total positive charge "1.2" and, at the same time, prevent its explosion which must be expected because of the Coulomb repulsion? This would make necessary the further assumption of new forces which would be like nuclear forces. Furthermore, mesons are known only to have a charge e (positive or negative) or no charge at all. The assumption of positive pions with a charge e each would mean that the pion cloud has several elementary charges, i.e., that the proton, for example, at a charge distribution 6 minus 1 would have 5 elementary charges; it would also mean that the total charge of a proton would change considerably if a pion were freed.

But if one assumes the charge of a pion and also the charge of the "hard core" to be a little smaller than e, then this is practically already an acceptance of the photron theory of the author, which explains the elementary charges of charge carriers and of ostensibly neutral particles to be the result of photron charges of opposite polarity[17]. And in that case the "cloud model" would be superfluous.

The "cloud model" of the proton is obviously based on Bohr's atom model. But to imagine the proton as a kind of sub-atom seems to be untenable also because the nucleus with a pion cloud would have to be at least equal-charged, so that at best a negative nuclear charge could prevail or, that a positive "core" with a negative pion cloud could be assumed. Open would also remain the question of the cause of the energy levels during nucleus emission.

Unclear is furthermore what kind of particle the "hard core" should be, whether a meson or something else; whether it can exist without the surrounding "cloud"; whether it has a structure (perhaps a sub-core with a sub-cloud, etc.); and what will be destroyed when a proton disintegrates (through an antiproton, for example), whether only the "cloud" or also the "core".

Even if the "cloud mesons" exist only "within the quantum-mechanical fluctuations of the system", for the estimation of charge conditions only the actual existence of these particles in their particular state makes physics sense. The existence of protons, mesons, etc., is after all a physical reality, even if one wants to consider these particles as the materialization of a corresponding "particle field", such being the base of present mathematical treatment. The structure of these particles can of course be estimated and registered by measuring techniques only when they are actually present.

But according to the photron theory, de-materialization of matter does not really exist. Rather, material photron complexes can dissolve only through dissociating radiation in the form of trains of distant photrons. Thus, the mathematical presentation used heretofore is — by physics standards — based on pure fiction and its concurrence with physical reality seems problematic.

Since it has meanwhile been recognized that change effects of seemingly uncharged neutrons or of similar particles are based on a kind of polarized charge, the term "baryonic charge" has been coined[18]. There is thus a charge effect which occurs instead or alongside of the familiar "electrical" charge, which differs from gravitation by its polarized occurrence, and altogether does not conform with the mass value of the particle. But this is a fact which has been advanced and proved in the photron theory of the author.

In the case of a proton constructed according to the photron theory, however, it is plausible, that the proton can scatter an electron as well as another proton, and that because of electrical changes in the structure of such stable particles during the high-energy attraction process those effects may appear that were noticed during the scatter experiments.

When a low-energy electron gets close to a proton it is "caught" by the proton and a hydrogen atom forms. But various effects can result when a high-energy electron meets a proton, whereby the probability and frequency of such effect depends largely on the energy. The electron may deform the structure of the proton and may possibly remain therein; it may cause a change perhaps by setting off a gamma radiation; or often it is ejected with approximately the same energy with which it penetrated into the structure of the proton. This last possibility may occur during the "electron-proton scattering". This view is simple and understandable and not as full of contradictions as the heretofore advanced view of that proton structure which has been deduced from the electron-proton scatter experiments at Stanford.

Proton-proton scattering results from the Coulomb repulsion of proton charges. According to the present views of the structure of the proton, however, the "meson clouds" would have to dissolve another mutually; thus, instead of a scattering, a destruction of the structure would occur. It is assumed that proton-proton scattering occurs when "meson clouds permeate another". But this would probably result in an extensive freeing of mesons, should the present view of the proton structure be valid.

On the contrary, a proton existing as a compact photron configuration may very well "regenerate" itself completely when a meson is ejected from it which, by the way, will only be the case when an instability in the structure has occurred[19], i.e., when the meson mass was more or less excessive. The proton will always return to the stable condition which is marked by its normal charge and mass and by their relation $\frac{e}{m}$. But it is not known how this could be the case under the assumption of a structure with a "meson cloud".

One will indeed have to imagine the nucleons as photron configurations, i.e., probably not as a "cloud model", but as compact formations which, however, may differ in their interior arrangements. As already mentioned, configurations with an arrangement of electrons, positrons, and mesons will mainly make up the inner structure of the nucleons. The compound-nuclei are to be considered as configurations of nucleons, electrons, mesons, etc., with additional photron "filler mass". It should not surprise then, that the nucleus can emit particles which according to the hitherto-current concept of its structure "seem not to be contained in it".

Effective become, according to the photron theory, always mainly the surface charges of the corpuscular "elementary particles". In a stable condition is the inner charge structure, in a sense, neutralized. Accordingly, the protons do not have a repulsing "hard core" with a meson cloud; the concept of such a charge distribution, derived from the scatter experiments, has been (falsely) suggested by the scatter mechanism.

The author's presented concept of the proton structure thus agrees with the findings of the Stanford scatter experiments insofar as that the charge of the protons is not evenly distributed throughout their volume nor that it is concentrated in their center[20]. Rather, it is to assume that the charge is approximately evenly distributed over the proton surface, at least in the case of the stable free proton, and only this surface charge will noticeably occur as long as the protons are sufficiently separated among themselves and from other corpuscles. But if the structure is upset, additional inner potentials will enter into the play of Coulomb forces.

Thus the photron theory makes possible an understanding of the nuclear forces and their attracting and repulsing areas as well as the cause of inner movements of the nuclear matter; of the nucleon structure itself and of the scatter mechanism of high-energetic particles.

C. Further Hints and Summarization

In part A of this work it was shown, that the energy of a light-like radiation conforms practically to the square of the reciprocal wave length. On the one hand, it is yielded according to the radiation concept as a spiral electro-magnetic photron movement, based on the validity of the helix wave[21]. On the other hand, the same result will be obtained when one equates the impulse of the impact electron, which causes the light emission, with the impulse of the radiation caused thereby[22]. However, this practically square relation leads — because of a "degree of effective radiation" resulting from existing "parity conditions" — again to a practically linear connection of the reciprocal wave length with photo-electric phenomena[23]. This practically linear connection between reciprocal wave length and photo effect seemed to be up until now the connection between radiation energy and frequency and/or reciprocal wave length proper. A square relation of reciprocal wave length and energy has been known thus far to be characteristic only of matter radiation (24) and occurs with light radiation mainly in the square law of the spectral terms. The new concept of light-like radiation as a photron movement constitutes now a complete analogy between matter radiation and light-like radiation, the light-like radiations, however, being marked by "parity effects".

From the assumed mechanism of radiation release it furthermore follows, that the energy of light quanta of an atom electron light emission caused by impact electrons can be only half of the energy of the impact electrons, since this latter energy will distribute itself during the "electrical stimulation impact" on the released radiation and on the remaining mass of atom electrons[25].

These conditions will be proved when one proceeds from the above-mentioned square relation between reciprocal wave length and radiation energy and puts in a relation the difference of the energies of the spectral lines of the terms thus received with the difference of the measured electrical stimulation energies of these spectral lines[26].

In addition to a realistic explanation of the mechanism of atomic light emission and of the origin of spectral terms we thus receive the surprising confirmation, that the linear relations between radiation energy and reciprocal wave length[27] assumed by Planck must be considered as invalid, and that the energies resulting from the various wave lengths are in each case only half of what has been assumed sofar. The relation with the measuring data of photo-electric electron emission explains itself from the effect of a few "double quanta"(28). These double quanta result of necessity(29) during the peeling-off of photron layers of the electron (ratio of nega to posi photrons 2 : 1). Photo-electrons with maximum energy will indeed occur only infrequently(30), while most photo-electrons have considerably lesser Volt speeds. Already Ramsauer found during examinations of monochromatic light that the maximum energy distribution of photo- electrons lies at energy value "1" as opposed by to the maximum value of occurring Volt energy in the area between "2.5" and "3". Already the energy value "2" is detectable in only a small percentage of photo-electrons(31). This corresponds fully with the new concept. If one sets the maximum Volt energy of the photo-electron as $h \cdot \nu$, then, according to the new concept and in agreement with the above-mentioned measuring values, the maximum of the energy distribution in eV should be expected to be slightly under $\frac{h \cdot \nu}{2}$. This, however, applies mainly to the major lines of the terms, while at their high end frequencies the proportion of double quanta gets higher and hence will change the curve. This also agrees with hitherto findings. Also easily explainable through double quanta are luminescence phenomena observed lately, which deviate from Stokes' rule.

It seems surprising that this "halving" of radiation energy has not become more apparent until now; and that work with the double value of the real light energy could proceed seemingly without contradiction. But here the following correlation must be pointed out: As is known, in classical mechanics the kinetic energy of a moving body is as $\frac{m \cdot v^2}{2}$. Hence, for "light quanta" the kinetic energy would be as $\frac{m \cdot c^2}{2}$. But the theory of relativity invalidates this equation and gives the value of light energy as $m \cdot c^2$.

If one puts now the newly determined (half of the old value) light energy as $\frac{m \cdot c^2}{2}$, then it seems to be clear that the old, erroneous values could have been only set as being equivalent to the double mechanical energy ($E = \frac{m \cdot c^2}{2}$; $2\,E = m \cdot c^2$). The reason for the "relativistic postulate" for the mechanical energy equation of radiation seems therefore to be clear: One error was "compensated" for by another error.

Furthermore interesting appear to be those radiations, which are emitted from free electrons outside of an atom connection, i.e., in absence of atomic nuclei.

It has been shown, that according to the "atom model of the photron theory" the light emission of atom electrons — caused by impact electrons — has a spectral distribution corresponding to the energy of the impact of the electrons. The radiation given off occurs in "quanta" whose value is the result of the supplied energy portion. With a thermic luminous stimulation the spectrum will pass into a state of continuity because the marked change effect between electron impact energy and light emission is eliminated and its place seems to be taken by a mutually continuing influencing of the electrons(32).

The free electron must be considered as an especially stable structure (33), will therefore not tend to emit photrons. It will require relatively high energies in order to remove "photron layers" from a free electron.

Electron rays indeed show no luminous effect at normal acceleration, but they, too, will become luminous at high accelerations starting around 100 MeV[34]. This light emission apparently is traceable to mutual influencing ("electron friction") at high electro-magnetic ray contraction, which causes a continuing spectrum; and such is indeed in evidence at this "synchrotron radiation". Also observed can be expectant polarisation characteristics[35].

It is also to be expected, that through mutual structure modification of electrons accelerated against another with high energy a radiation can be achieved which occurs linear, like atomic light emission, even though it will be a radiation with a higher energy.

It is known, that free electrons and positrons can destroy each other and thereby destroy their structural arrangement as photron complexes[36].

During this "pair destruction" a hard radiation of the wave length $0.024 \cdot 10^{-8}$ cm occurs (measured by J. duMond).

Since two electron masses according to the equation for "energy capacity of mass" $E = m \cdot c^2$ and after the statement $m \cdot c^2 = h \cdot \nu$ will yield a "destruction wave length" of $0.024 \cdot 10^{-8}$ cm, the existing assumption of the "energy conversion of matter" seemed excellently proved.

According to the photron theory and as already mentioned, only half of the old values will result for the electrical energy[37] $E_{el} = F_w \cdot N \left(\frac{1}{\lambda}\right)^2$ equivalent to the radiation energy. The radiation as such has the kinetic energy[38] $N \cdot \left(\frac{1}{\lambda}\right)^2 = \frac{m \cdot v^2}{2} = \frac{m_s \cdot v_s^2}{}$,

i.e. the classical formulation for "live force". The assumption of an "energy capacity of mass", exactly defined through the mass value as such, will, however, become invalid. In the equations, F_w signifies the "degree of effect of radiation" which makes allowance for the "parity conditions"; m_s the electro-magnetic quanta mass (apparent, i.e., "relativistic" mass); and v_s the speed of progression (light speed c); but m the actual material quanta mass; and v the effective photron speed in the spiral course.

According to the photron theory, an energy potential of matter results from a charge instability of the photron complex giving off the energy. A charge excess of n photron masses with identical polarity results, by using the Coulomb law, in an energy $E_n \approx \frac{f_r \cdot n^2 \cdot pm^2}{2}$,

whereby the factor f_r signifies the reciprocal value of a fictitious mean distance of the photrons of identical polarity which participate in the reaction; n , as mentioned, the number of these photrons; and pm the size of the charge[39]. Since the resulting charge L_n and/or e of the photron complex is derived from the number, size of charge, and polarity distribution of its photron corpuscle, the equation will formulate as

$E = \frac{f_r \cdot L_n^2}{2}$ or $\frac{f_r \cdot e^2}{2}$ [see footnote (40)]. But this statement applies only to the resulting potential of an inner instability of the photron complex, hence it is not, or only conditionally, applicable in case of "pair destruction" through mutual influence. In any case it can be assumed, that the kinetic energy of a disintegration of matter is derived from electrical energy potentials created during the inner rearrangement of the photron structure; i.e., when the complex has become unstable through outside effect and thereby disintegrates or seeks to attain again a stable condition.

It should also be of interest how recharge phenomena can be caused by radiation, i.e. how the known respective light effects can be explained.

According to this work, a radiation quantum is formed by a photron chain having a resultant electrical charge of an "electrical elementary charge e" with a minus sign(41). Such light quanta are caused on the one hand by impact electrons and may in turn produce photo-electrons, they represent therefore the radiation equivalent of the energy quantum statement ($e \cdot V$) of the matter-electricity, as a result of an impuls transmission. The quanta energy of the radiation varies with the triggering energy. According to the mechanism of quanta release, just as the quanta energy varies so also varies the quanta mass, but amounts in the case of light and heat radiation always only to a small fraction of the electron mass. Energy-rich quanta of higher-frequency radiation possess a ratio of negative to positive photrons which differs less, i.e. a greater "electrical parity", than the quanta of energy-poor radiation (42).

Thus in any case a "light quantum" always transmits an "electrical elementary charge e"; and it could be assumed, that because of the negative character of the light radiation every body receives a negative charge. But, as we know, this is not the case.

The light quanta are thus deficient of the greater part of the electron mass, even though they carry the resultant charge of the mass. They can either stimulate or ionize atom electrons; and conceivably they could in certain cases also form new electrons; but sufficient quanta would be required for such a new formation to provide the necessary mass of electrons. Photronic electricity as such seems to be of a certain consequence in the interior of poor electricity conductors, for example in semi-conductors or at insulating-layer cells (insulating-layer cells, inner photo-electric effect, transistors, tunnel diodes, thermo-elements). Usually the effect of light energy will show itself by way of influencing of electrons. As is known, the electro-magnetic energy of the quanta of hard radiations equals under circumstances the energy of a mass which is the multiple of an electron mass.

If the radiation sets off an electron emission, the affected body will not charge itself negative but positive, since it is losing more negative charge than was supplied by the radiation. This phenomenon was discovered already in 1888 by Hallwachs.

But an electron emission does not always have to be the cause of a resulting positive charge of a body exposed to radiation; the photron theory itself also gives another explanation. The striking radiation itself may again cause another radiation, which — according to the Stokes rule — is of low frequency and hence of lesser electrical parity. And above all, every light radiation may be followed by a heat radiation. During such radiation, however, relatively more negative than positive photrons are lost because of the unequal "parity relations"(42), than were supplied by the triggering radiation; i.e., there is the paradox that the supply of negative radiation quanta on the base of such conditions will result in a positive charging.

Generally and according to the photron theory, the formation of electron structure requires a ratio of negative to positive photrons as 2 : 1(43). If for no other than this reason, a radiation of high "parity" — one which has a share of positive photrons greater than 1/3 — can by itself lead to positive charging effects.

With these hints this work shall conclude.

In summarization the following should be retained from articles A through C:

The photron concept of light and matter makes possible to explain qualitatively and quantitatively the conditions of atomic light emission. The atom model of the photron theory has energy levels formed by electrons surrounding the atomic nucleus which — in analogy with the potential conditions of the earth's field of gravity — increase with the distance from the nucleus. These energy levels of the electrons are timewise defined by the stimulation of impact electrons, which are based on an atomic temperature; until the start of the stimulation, the atom electrons are set on their course by preceeding "pushes" of electrons, whose energy does not yet suffice for luminous stimulation.

The atomic light emission occurs through the atom electrons by way of the giving-off of photrons. The electrons are constructed of photrons in a layer arrangement following a "law of the tri-complex", whereby negative and positive photrons are present in an approximate ratio of 2 : 1, and the electron charges are formed by a third of the photrons of the extreme layer as a rest charge. But because of the tie to the nuclear potential, the number of photrons is larger in the atom electron than in a free electron, whereby the additional number of photrons may be located on the atom electron proper or in its vicinity. The impact electron, which causes the luminous stimulation, transmits approximately half of its kinetic energy to a released photron light quantum, and the other half to the atom electron as such. The "effective degree" of atomic light discharge lies therefore in the area of 50%, if one disregards additional losses which may further reduce this effective degree. The highest frequencies are set off in the deepest energy levels of the atom electrons, since here the greatest release energy is required, while the lower-frequency mainlines of the terms originate in the highest energy levels of the atom electron and therefore are marked as to their intensity, since they require the least impact energies which dominate by the Maxwell speed distribution of impact electrons.

The lawful validity of the spectral terms proper is the expression of a practically square relation of light energy to reciprocal wave length of the radiation; the radiation energy grows by the square of the reciprocal wave length. This harmonizes with the phenomenon of the unchangeable Compton wave length.

As a light quantum (called "photon" in the Anglican world) should be considered a number of photrons, which carries a resultant electrical charge of the value of an electrical "elementary charge e". The quanta phenomena of radiation result from the change effect between radiation and electrons. On the one hand, the radiation release occurs in gas discharges always with definite energy values — electron charge e times respective "stimulation charge" — and on the other hand, the photo-electric effect requires for equal-energetical photo-electrons analogous energies.

Since the number of photrons of a "light quantum" may differ — deeper frequencies will have a lesser number of photrons per "light quantum" than higher frequencies, and thus will have a greater disruption of the "electrical parity" than the latter — an "effective degree" of the radiation proper will result. This effective degree, for which the parity conditions are responsible, leads to a practically linear relation between photo-electric phenomena with the reciprocal wave length. These conditions can be best understood by way of an impulse transmission. The maximum photo effect is thereby caused through "double quanta", which originate during the peeling-off of a photron layer of the atom electrons. These double quanta are also the cause of an emission of higher frequencies out of luminous materials through lower-frequency radiation contrary to Stokes' rule.

In addition to the finding, that light energy does not increase lineal but with the square of the reciprocal wave length, the finding that surprises especially is that light energies are only half of the size of what has been heretofore assumed for a respective wave length. Electrically this is noticeable in the photo-effect in that the intensity maximum of the energy distribution of the photo-electrons differs greatly from the maximum-occurring energy. Now the kinetic energy of radiation will be derived from the classical statement $\frac{m \cdot c^2}{2}$, while thus far the "relativistic" statement $m \cdot c^2$ doubled this half energy. Two erroneous statements complemented another to yield a correct result.

Unchanged, however, remains the traditional statement for the radiation impulse $m \cdot c = \frac{h}{\lambda}$. For this statement, the concept of radiation as an electro-magnetic photron helix provides the basis: Is the interval of the helix spirals equal to the "wave length", the electromagnetic impulse will grow lineal with the relative number of these helix spirals, hence with the frequency or reciprocal wave length.

The atomic nucleus proper is again a structure of photron masses. But it appears to be a peculiarity of the construction of the matter that photron complexes will form primarily with an electric charge — directed toward the outside — of the size of "elementary charge e" and in accordance with the "law of the tri-complex", of which the electron is the most stable structure because as a corpuscle it shows the least mass value for the rest charge e. Mesons may originate in the same manner. Stable as the electron seems to be the positron, only its free existence is limited to short periods by the dominating negative photron radiation or the meeting with electrons. In the photron structure of the nucleus such corpuscles form at first "virtually," i.e., as photron configurations. Out of these structures may in turn come larger configurations, namely "nucleons". The "birth" of a particle takes place in the nucleus, in that the respective configuration of photron masses separates from the remainder of the nuclear matter through mutual movement, i.e., mostly rotation. But all particles are to be considered as compact structures, except for their inner structure, and not, as has been assumed thus far, as systems with a nucleus, charged with a charge opposite to the exterior charge, and a meson cloud said to represent the charge of the particle.

The nuclear forces can be explained in terms of the Coulomb law, making allowance for the structure of the particles. The nucleons cannot be considered as point charges. The nuclear forces to be assumed, and their seemingly exponential characteristic, can be explained with the change effect of the protons of the nucleus with the nuclear matter lying in between, with mostly electrons as connecting links. It must be assumed that electron configurations exist in between the compound-nuclei. A repulsion area between nucleons results from a "destruction" of negative binding matter through its absorption into the structure of the protons. A subsequent ejection, i.e., a "recreation" of identical or of new photron complexes, the result of an occurred inner instability of proton structures, causes an exchange play of nuclear forces and the creation of mean distances as well as inner movements in the nucleus. During these processes, the photron mass balance will remain unchanged.

The resultant charge of an "elementary particle" is according to the developed concept concentrated mainly on the surface of the particle, while the existing charges in the interior of the particle — under stable conditions — neutralize another to a large extent. The proton therefore does not possess, as mentioned, a "hard core" with a meson cloud, but a solid structure of photron masses with different configurations in a prevalent layer construction. The conventionally assumed proton structure, deduced from the scatter experiments, is an illusion caused by the scatter mechanism.

Thus the atomic conditions in nucleus and electron mantle have been subjected to an extensive explanation, which also extends to the validity of the law for emitted radiations.

Correction in the Print

In the first part of this work, Neue Physik, Vol. 4/5, 1959, p. 129, line 3 from the bottom, it should read "the increase" instead of "the decrease".

Footnotes

(1) Neue Physik, Vol. 1, No. 4/5, (1959), "The Atom Model of the Photron Theory. A. Conditions in the Electron Layer and Spectral Terms."

(2) Compare K. Nowak, "About the electrical Charge and the Construction of Matter", Periodical Science Without Dogma (W. o.D.), 1957, Vol. 5; and "About the Characteristics of Light-Like Radiation and the Structure of Elementary Particles", Neue Physik, Vol. 2, 1959, pp. 52 and others.

(3) Compare report in Neue Physik, Vol. 3, p. 112, 1959.

(4) Compare K. Nowak, "About the Characteristics of Light-like Radiation and the Structure of Elementary Particles", Neue Physik, Vol. 2, 1959, pp. 49 a.o.

(5) Comp. report in Neue Physik, Vol. 3, 1959, p. 109.

(6) Comp. Neue Physik, Vol. 2, 1959, pp. 51, a.o.

(7) Comp. Neue Physik, Vol. 4/5, 1959, pp. 128 a.o.

(8) Comp. K. Nowak, "About New Mathematical Basis of the Atom and Radiation Physics", Publisher Neue Physik, Vienna, 1959, pp. 60 a.o. Referred to in the following as Mathematical Basis.

(9) Ibid, pp. 64 a.o.

(10) Ibid, p. 75

(11) Ibid, pp. 58 a.o.

(12) Comp. W.o.D., Vol. 5, 1957, p. 8 and Neue Physik Vol. 2, 1959, p. 54 and report in Neue Physik, Vol. 3, 1959, p. 112.

(13) Comp. "Mathematical Basis", pp. 58 a.o.

(14) Comp. E. Segre, Nobel Presentation Address 1959 (Report in Phys. Bullet., 6/1960, p. 314.)

(15) Comp. Report by W. Macke, Phys. Bullet., 2/1959. p. 62

(16) Comp. p. 49, this Volume.

(17) Comp. W.o.D., 5/1957 and Neue Physik, Vol. 2, 1959, pp 47 a.o. and "Mathematical Basis", pp. 18 a.o.

(18) Comp. for example Referat W. Braunbeck, Phys. Bullet. 5/1960, pp. 267 a.o.

(19) "Mathematical Basis", p. 60.

(20) Report Referat R. Hofstadter, Neue Physik, Vol. 2, 1959, p. 45.

(21) Neue Physik, Vol 4/5, 1959, p. 141 and "Mathematical Basis", pp. 41, 47.

(22) Neue Physik, Vol. 4/5, 1959, pp. 141-144.

(23) Ibid, pp. 164-169.

(24) Comp. for example M. v. Ardenne, "Electron Supermicroscopy", Berlin, J. Springer, 1940, p. 6.

(25) Neue Physik, Vol. 4/5, 1959, pp. 138, 143, 161.

(26) Neue Physik, Vol. 4/5, 1959, pp. 153-161.

(27) "Mathematical Basis", pp. 9-14.

(28) Neue Physik, Vol. 4/5, 1959, pp. 161-165.

(29) Ibid, p. 163.

(30) Ibid, p. 164.

(31) C. Ramsauer, Annals of Phys., 1914, pp. 1121 a.o. (Fig. 1-3).

(32) Neue Physik, Vol. 4/5, 1959, pp. 124, 160.
(33) Ibid, Vol. 2, 1959, pp. 50 and Vol. 4/5, 1959, p. 128.
(34) Ibid, pp. 60 a.o.
(35) Ibid, Vol. 6, 1959, pp. 177 a.o.
(36) Ibid, Vol. 4/5, 1959, pp. 127.
(37) Ibid, p. 146.
(38) Ibid, p. 148 and "Mathematical Basis", p. 39.
(39) "Mathematical Basis", pp. 58 a.o.
(40) Ibid, p. 68.
(41) Ibid, p. 50 a.o.
(42) Neue Physik, Vol. 4/5, 1959, p. 158.
(43) Ibid, Vol. 2, 1959, p. 50.